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VOL. XIV

JUNE, 1908

No. 9

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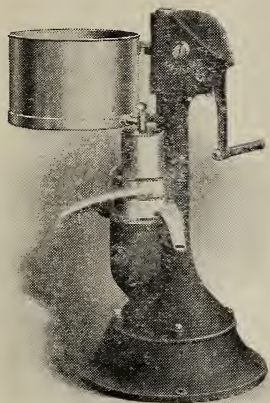
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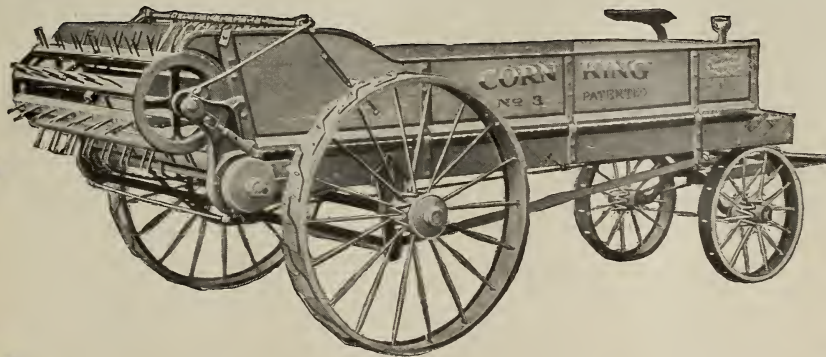
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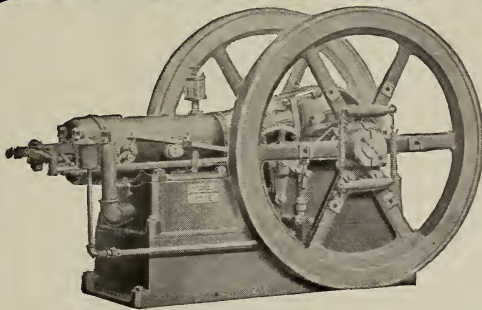
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No. 9

THE MANUFACTURED PRODUCTS OF CORN

B. M. Hendrix, '09

Often we think of corn as only a stock food which is used on the farm or in the city stables, but the uses of corn are very many in making articles which are either used as food or in the arts. The Corn Products Co. of Chicago, alone puts on the market about twenty distinct varieties of corn products. In many cases corn is also used in making alcohol and distilled liquors.

Starch is the most common of the products of corn. The finer grades are used as a human food, while the poorer grades are used in laundry work and as a mordant in calico printing. As early as 1884 forty thousand bushels of corn were used daily in starch making, and by 1887 the amount had increased to fifty thousand bushels. The process of starch manufacture is comparatively simple. The grain is steeped in water for three or four days, and then crushed in a mill through which a stream of water is constantly flowing. Then the hulls and germs are easily removed because they will float on water when the mash is collected in vats. After the germs and hulls have been removed, the starch is washed by decantation, that is by allowing the starch to settle and drawing the water off at the top. Formerly caustic soda was added to the starch to remove the gluten, but at present this method is not used because the gluten is used as

a stock food. In the settling process the starch does not settle quite to the bottom, but the horny part of the kernel which is rich in proteids is found there. In the newer processes of manufacture the starch is removed from the settling vat and placed in a centrifugal machine. When this machine is put in motion the starch collects around the walls of the vessel while the water and impurities remain in the center. The starch is packed in this position so firmly that it is cut out in blocks. The starch is then dried on a heated floor and is ready for market.

Glucose is one of the most interesting of the products of corn for several reasons. (1) Because it has been used in the past as an adulterant in such syrups as maple and sorghum. Such adulteration was very profitable to those who practiced it, because glucose costs only about half as much as the other syrups.

(2) Recently the Corn Products Company, in a trial before the Food and Drug Commission of the Department of Agriculture, gained a privilege of labeling their product, "Corn Syrup," instead of "Glucose." They argued that to the people in general the word glucose brought the idea of a glue factory, hence the product would not sell so well. The company seems willing to admit that the product is

glucose, but on account of the slight similarity in the words "glue" and "glucose" they want to call it "Corn Syrup."

(3) The use of glucose as a food is increasing very rapidly. A large number of the table syrups on the market are glucose. These syrups are not quite as sweet as those made from cane or maple sap, because glucose is not as sweet as cane sugar. Formerly an aromatic compound known as saccharin was added to these syrups to increase their sweetness. This has been stopped by the Food and Drug Commission as far as possible.

Glucose is made from corn by first preparing the starch. The starch is then boiled up with dilute mineral acid to change it to glucose. Only a small amount of acid is used as it does not enter into the reaction. The change requires several hours for completion. Formerly sulphuric acid was used in this country, but at present hydrochloric acid is being used. When sulphuric acid is used, it is neutralized with chalk and the precipitate filtered off, but when hydrochloric acid is used it is neutralized with sodium carbonate and the common salt remains in solution. The solution of glucose obtained is very dilute. It is concentrated by boiling at first in open pans and then in a vacuum evaporator, until a thick syrup is obtained. Formerly the glucose was bleached by the use of sulphurous acid, because when prepared it has a brown color. The Food and Drug Commission has decided that this is adulteration so at present it is not used. However, when perfectly pure starch is used the glucose is not colored.

The by-products of starch and glucose factories are many. They consist largely of different kinds of cattle

foods and some things that are used in the arts.

Corn oil is becoming an important by-product. It is extracted from the germ by pressure. The entire grain contains about seven per cent. of oil, while about five per cent. is obtained in the commercial method of extraction. The oil is being largely used in the soap factories. It can be substituted for olive and cotton seed oil for some purposes. Corn is being used in the manufacture of breakfast foods, but as the processes are secret and protected by patent it is impossible to describe the method of manufacture.

Another large use of corn is in the manufacture of alcohol and distilled liquors. The process is an old one and is more or less familiar to all. The use of corn will no doubt increase when the use of denatured alcohol becomes common. If alcohol ever becomes a source of heat, light and power, it is evident that the demand for corn will be greatly increased. Some distilled liquors are made from corn, but they are not the best and are perhaps on the decrease. Certainly they are not on the increase in the same ratio the other articles made from corn are increasing.

The list of cattle foods from the starch and glucose factory and distillery is a long one. They have been on the market for only a comparatively few years. The distillery grains have been known for a longer time than the others. The result of manufacture is to increase the percentage of protein, starch being removed in every case. This however, does not apply to the bran made from the hulls. This bran is very low in protein, but this is due to the fact that the hulls contain very little nitrogenous matter.

Formerly the hulls and germs were

ground together and sold as gluten meal, but at present they are separated and the bran is sold separately. Gluten feed is the chief cattle food from this source because it is rich in protein and is palatable to the animal. It is made from the germ and the horny part of the kernel. The substance was formerly washed out as useless, but the manufacturers have learned its value as a stock food, so have placed it on the market. The development of the manufacture of corn product is of great economic importance to the farmer for at least three reasons:

(1) The factories require a large supply of corn of good quality. This has a tendency to put a premium on

good corn, hence the farmer will improve the quality of his crop by selection, cultivation and fertilization.

(2) It prevents an over supply of corn on the market, because different industries tend to increase the demand as well as to make it more constant.

(3) The by-products are largely taken back to the farm and in this way some of the fertility removed by the crops is returned. The nitrogen in particular is returned in this way. The argument has been made that the prohibition movement will reduce the price of corn but so long as the present increase in glucose and starch factories continues, there seems to be little danger along this line.

THE PONY

J. L. Edmonds

In American no great interest has ever centered in the breeding of ponies or small cobs. It is only recently that they are becoming to be appreciated at somewhere near their value. From the success of certain dealers and the trend of affairs in general it would seem that the demand was of such proportions as to merit more attention from the producer of market horses. The aim, where it had any, of most of the horse breeding in the country, has been to producing something big or fast. Too much attention has been paid to the mere size of bone and muscle and not enough to the arrangement and relation of these parts and their effect on the service the animal is capable of rendering. Among some of the other things which have worked against this class of horse is the style of vehicle largely in use. Appropriate vehicles are greatly aiding in increasing the ponies' popularity.

Many persons interested in horses will not, or if they do, hate very much to do so, admit that the automobile has cut any figure in the horse market. No doubt, it has not damaged the trade much in really high class carriage or draft horses, but nevertheless, it has made quite a difference in the demand for ordinary good carriage horses suitable for town work in station wagons and the like. In many private city stables, where formerly a pair or two were kept, they are now doing the work with an auto and a single horse which is likely to be a useful cob or pony.

There were formerly great numbers of ponies in our western states, variously known as mustangs, bronchos, Texas and Indian ponies. There may be fine shades of differences among the above groups but they are pretty much the same. No particular effort or care was exercised in their breed-

ing; they were largely a matter of chance mating and environment. These ponies were useful and otherwise, oftentimes the latter. However, in the establishment of the cattle ranches on the plains they rendered an unestimable service. The most useful feature of this pony was his ability to withstand circumstances. This toughness was not always accompanied with beauty of conformation or an amiable disposition. From their numbers some choice polo ponies have been obtained and it seems a shame that more has not been done to preserve the better representatives and breed them with discrimination.

In later time quite a few persons have found it very profitable to produce Shetland ponies, which are probably bred in greater numbers than any other one breed. Those in this country have all descended from stock imported from the bleak and barren isles of

the same name. The Shetland is pre-eminently the young child's pony, because of his great docility and general harmlessness.

If we accept the standard sought for in breeding the larger light horses, many of the Shetlands fall far short. Chief among these faults is a straightness of shoulder, together with this is often associated a short, thick neck and a sloping, dubbed-off rump.

The Welsh and Exmoor ponies, although plentiful in parts of Great Britain, have never been exported in any considerable numbers and consequently very few of them are bred in this country. These ponies make a very useful sort both to ride and drive. They are larger by several hands and much more active than the Shetland. As a rule they have splendid feet and legs.

In the East, along with the breeding of his full sized brother, we find a con-



"IRVINGTON TOM TROT"

Three Year Old Hackney Pony Stallion, Owned By W. D. Henry, Sewickley, Pa.

siderable number of Hackney ponies being produced. This number is on the increase and will increase faster as they become better known. The Hackney pony is the "aristocrat," "the gentleman" of the pony world, and like the true gentleman, he is very useful as well as ornamental to a high degree.

This pony is nothing more nor less than a miniature Hackney horse with all his good features but size. The Hackney under fourteen hands ranking as a pony, has been produced by selection in breeding. His deserved popularity is probably due more to the fact that he is "put up" like a horse than to any other one thing. An undesirable, undersized weed or runt does not make a pony, although he may pass under that name.

A pony brings money on the market according to the degree of excellence in which he possesses action, style and symmetry of form. The Hackney pony possesses all these with a most vigorous constitution and wearing qualities. They show a marvelous amount of bone for their size. He has lots of ambition and "gump" in his make up, without any "yellow streaks" even when feeling a little beyond himself.

This latter trait makes him very desirable for older children, for in the handling of this kind of pony they are more liable to develop some degree of skill as horsemen. The Shetland is a good companion, but too much like a big wooly dog to be of much value in this respect. The use of Hackney pony blood has been productive of some wonderfully "smart" ladies' pairs. Crossed on Welsh foundation stock a pony is produced which has not always quite the high action of the

Hackney, but a good useful sort with the right kind of shoulders for a saddle pony.

At the last National Horse Show, in Madison Square Garden, no little furor was created when the Hackney pony, Lady Dilham, won the championship, not only over ponies in harness, but over the big ones in the final line up. In England the equal of such ponies as Julius Caesar II, Punderfield's Horace and Little Ruby are hard to equal among full size horses, both as to individuality and the value of the stock they get. Here probably the two best known pony stallions are the imported ones, Delham Prime Minister and Enfield Nipper.

Regarding the economy of the pony, at most work, except moving heavy weight, they will do a big horse's work on the feed of a small one. When it comes to withstanding grief and fresh air, nothing in the equine world is "in it" with the pony. With lots of fresh air they will get fat on their own "bed straw." They "go further and recover quicker than most larger horses."

In this country some men have not succeeded well as pony breeders, because their breeding and growing of the stock was done too well. They grew too big. The poorer and rougher pastures are best suited to their development. The smallness of the ponies' appetite is not the least point in his favor. The ponies shown in the cuts were all sired by "Enfield Nipper." With the pony "Bounce," Mr. W. D. Henry won the championship for ponies in harness at the last Pittsburg horse show, over such ponies as imported "Berkley Bobs," formerly in the stable of Judge Moore.

POSSIBILITIES OF THE UP-TO-DATE FARMER

F. L. Allen, '06

What is meant by the term, "Up-to-date Farmer?" To me it means that individual who possesses a knowledge of the soils, their productiveness, and who can grow and market those crops best suited to his conditions of soil and market. Although the per cent. of this type of farmer may be small, yet I believe their number is steadily increasing.

His possibilities have proven to be many. The ordinary "happy-go-lucky," that man who does things because his father and neighbors do them, has made a fair living for the past few years, while the modern one has become vastly independent, many of them commanding fortunes at the present time.

Eastern farms with fine buildings have been abandoned in the past. While at the present time, owing to the extremely high price of land in the corn belt, these farms are being taken up again by men who have a good knowledge of soils, fertilizers, and the markets. These men are realizing great returns, and have fully demonstrated that the fertility of the land can be kept up indefinitely when properly handled and cared for.

How often have you heard that it does not pay to keep cows simply because there is no market for dairy products. However, if you investigate it will be found that any one producing a first class article never produces enough to supply the demand. Today butter can be shipped from the Pacific coast to the Atlantic for two cents per pounds and to Liverpool for two and one-half cents. If eastern men can

pay the price for our products, the shipping cost and middleman's living, we can certainly pay the shipping of the finished article.

Now, the producing of commodities of the farm is only one-half the problem, but the questions invariable asked in the leading papers by beginners and oldtimers as well, is how to make two blades grow where one grew before. What is the use to produce unless you can sell and sell right? Too many are content with producing a large crop, regardless of the quality, just as some men like to relate how much they do but never tell how they do it.

Thousands of fortunes have been made in handling farmers' products. How do they do it? They study the market demands. The farmer usually is content to sell for what he can get, the middle man buys it in bad condition. He cleans the grain, grades it, puts a fancy label on it. It attracts the consumer's eye and he pays the price. Farmers sell their apples for \$1.50 per barrel; they sell in New York for \$6. A Kansas farmer sells his wheat for 53c per bushel and buys flour at the rate of \$1 per bushel. Why is all of this? Railroads and elevators can not handle the great crops in a week or even a month and as a result a surplus drives a market downward. Supply and demand must rule prices and they can not help it in the long run. This was proven in the recent hog market when packers claimed they would fill their cellars with five and one-half and six cent stuff, but the hammer has been lifted above seven cents and the cellars are not filled yet.

Now why do the farmers grumble about hard times? The laboring class many times has a just reason for so doing. They are neither as strong in numbers or as wealthy as the farmer, but they stand together for their own rights. While the farmers knock, the middle men are studying their business and piling up millions. We talk of trusts and moneyed men while if we wake up and join hands we can have anything we want. This has been proven in many cases. There are at the present time over a million farmers in the co-operative association in the United States. There are 700 "co-op" grain companies. One at Ruthover, Iowa, saved to the farmers in one year more than five times the capital invested. A "co-op" cotton gin in Oklahoma pays \$2 per ton more for cotton than other factories.

Says a telegram to the Ohio State Journal: "The farmers' trust has arrived. It has stretched its big, strong hands over the states of Indiana, Illinois, Iowa, Kentucky, Wisconsin, Kansas, Nebraska, Oklahoma, Missouri and Texas. They have piled millions of bushels of grain and fruit and thousand of bales of cotton into a mountain heap and the trust has said to the dealers of the world, you can't have any of this until you pay us what we think is coming to us. Now do your worst."

Boards of trade and commerce men have awakened up to the fact that this is a powerful organization. All last winter they have been discussing scarcity of cars, but upon investigation they find a fiercer obstacle back of car shortage, the co-operative association.

The Grange and Farmers' Alliance were started when farmers were bank-



"IRVINGTON BOUNCE"

Three Year Old Hackney Pony Mare, Owned By W. D. Henry, Sewickley, Pa.

rupt as it were and they did great good but when times become better they lost force. Times are different today. Western farmers are not covered with mortgages as formerly. Farmers do not have to sell their produce. Western bankers are doing a good business, the farmers being the heaviest depositors. This class of people come nearer being independent than any other class in the United States, and the fight for its rights has begun, and begun in earnest.

I believe the day is coming when we will own our packing houses, elevators, stock yards, cotton gins, warehouses, cheese and sugar factories. Farmers must hold their produce until

delivered into the consumers' hands if the best price is realized. This system will and, I think, must be local at first then grow and expand as all great and successful enterprises have done.

In conclusion, I would say stop the making of the greatest fortunes by the handling of your own produce. Study the markets as well as the producing end of the business. Write to your senators and representatives when the farmers are trying to get their rights for numbers of personal letters rule in such cases. Study the co-operative schemes, forget prejudices and always be ready to lend help for a good cause and the farmers' possibilities will be almost unlimited.

DOES IT PAY TO SPRAY?

F. N. Fagan, '09

In the winter the question will likely come into the mind of many farmers, "Shall I spray my orchard this spring?" In several cases no doubt it will be answered by the farmer turning his back to the two acres of apple orchard and thinking no more about it. The farmer who sees the advantages in spraying will get out his barrel and spray pump and make things ready for the first spraying. He may or may not know the exact life-history of the disease or insect he is going to spray for, but thanks to our agriculture papers and experiment station bulletins, the farmer has gained his knowledge of sprays and spraying.

The first farmer may have a good crop of fruit from his unsprayed orchard, but the one who sprays has placed a form of insurance on the home apple supply for the family dur-

ing the winter. This is not saying that there can not be a successful crop without spraying, for there are often orchards that give good yields which have never been sprayed. But when this case occurs just turn and look at the trees and crop in the sprayed orchard. Spraying prevents a failure of the entire crop of apples. It gives the fruit a better color, increases the size of the fruit and also that of the entire crop. It will be said by the farmer who uses the spray pump in his orchard and the apples in his sitting room during the winter, that the apples from his sprayed orchard have better keeping qualities and a richer flavor than the ones from his neighbors unsprayed orchard.

A great difference can also be seen between the sprayed and unsprayed orchard trees in late summer. The

leaves of the sprayed trees will have the best color. The green will shine out in a bright, clear shade. The brown spotted leaves will not be so plentiful. The bark of the trees have that healthy appearance in a sprayed orchard.

The cost of the spray and spraying will be about fifteen to thirty cents per tree. Is this too much insurance to place on the home orchard? The man who is in the habit of spraying will answer in the negative.

Now, the right materials must be used in the right proportions and at the right time for the many disease and insects pests of the orchard. Never spray in the dark. Know at least for what you are spraying. Here are given some of the most troublesome pests that the farmer will find in the home orchard.

Codlin Moth and Apple Scab—The codlin moth. Spray with the mixture of an arsenite as paris green or arsenite of lead and Bordeaux mixture just after the blossoms fall, then again in seven to ten days and the third and fourth spraying at intervals of seven to ten days. In connectnion with the spraying for the codlin moth we have by the use of the mixture of an arsenite and Bordeaux a double spray. The arsenite for the destruction of the codlin moth and the Bordeaux in the third and fourth sprayings for the apple scab. The first spraying for the scab should be with Bordeaux mixture alone just as the buds are swelling and the second spraying just before the blossom opens. These are the two most important pests, and all orchards, large and small, are very likely to be infested with the above pests.

The spraying with Bordeaux for the apple scab will coincide with the

sprayings required to control the sooty fungus of the apple.

Bitter Rot of the Apple—As the bitter rot is known to spread from the canker on the limbs and also from rotted diseased apples of the year before it would seem that to control it would be to cut out the cankers and mummy apples while pruning the trees. But as a rule little thought is given to this disease when the trees are being pruned so a spray has been suggested in the ammoniacal solution of copper carbonate. Spray at the first appearance of the rot and every two weeks until three sprayings have been given.

Canker Worm—In spraying for the canker worm experiments have found the arsenites when used alone (not mixed with Bordeaux) give the best results. As soon as the young canker worms appear, give the trees a good spraying with arsenate of lead.

San Jose Scale—This scale may be a very serious pest to the home orchard, but can be controlled by the lime sulphur spray. Give the orchard a good spraying once or twice during that period when the leaves are off the trees and the buds are dormant. The farmer can do this in the late fall or early spring when general farm work is not pushing.

The above are the pests which will trouble the home apple orchard to the greatest extent. The remedies given for each pest will control the respective diseases and insects if the spraying is done in a very thorough manner. There is one statement upon which successful spraying is based. Know what you are spraying for and at what time your thorough spraying is the most effective.

BLACK ROT OF CABBAGE

B. W. Wells

In the last twenty or twenty-five years that vegetable pathology has been a recognized science and in its short life has accomplished such great things for humanity, it has not had more difficult problems or struggled with more elusive pathogenic conditions, than those set up by bacteria. And such a one is the theme of this paper, i. e., the brown or black rot of cabbage, a disease, which with others allied to it, long was misunderstood and misjudged, but which now is very well described though the exact toxic effect of the bacillus may not yet be entirely understood or explained.

The germ or bacterium bringing about this diseased condition, *Pseudomonas campestris*, is a member of a large and, from an economic standpoint, important genus under the great division Bacillus. Upon gaining access to the plant, its destructive work commences and once fairly started the entire plant is made worthless, for as yet no curative agent has been found which can in the slightest degree cope with it. So the entire matter is thrown into that class of diseases, where only palliative and preventive measures are of avail, thus making the study of its history, ontogenically considered, its mode of access to the plant, and its latent capacities of extreme importance, for only by the closest scrutiny of the facts can proper conclusions be drawn as to remedial measures.

That its baneful effects, from an economic standpoint, demand whatever attempts at relief that can be afforded by the vegetable pathologist, can be seen upon the citation of a few facts. In and about the city of Racine,

Wis., in three years the loss in cabbage alone amounted to one hundred thousand dollars, and in every place where it gets a similar foothold the destruction is proportionately as great. In one instance an entire field and a very extensive one was totally ruined, not a single head but was blighted beyond the possibility of use. Other cruciferous vegetables, turnips, kale, broccoli, collards and winter radishes are likewise attacked and may be destroyed in like proportion.

Further its geographical prevalence is a wide one, being known intimately in sixteen states, both north and south, in the others less prominent, due to the localization of acute cases and the application of proper methods to check it. It has been found and described in England and Europe only within the last five or six years.

Its origin is very uncertain. One writer believes it to be natively parasitic on wild mustard, having noticed some of these plants affected, far from any cultivated grounds. But an isolated case of this kind may be of little value when the various and possible ways of bacterial dispersion are taken into account, and even though many wild species were found diseased, it would always be an open question, which way the germs went, from the wild to the cultivated or from the cultivated to the wild plants.

Now to return to a more intimate discussion of the bacillus, its properties and its modes of activity.

Pseudomonas campestris, named by Pammel, its first describer, is a yellow, rod shaped motile bacterium, possessing a single polar flagellum. In hue it

may vary according to conditions, changing from a dull to a bright yellow. It is aerobic, or demanding free oxygen for the maintenance of vitality, and it neither a gas nor acid forming organism. Spore forming has never been observed in its reproductive processes. Its temperature relation is not a wide one being feebly active at 46° F., growing luxuriantly at 80° F. and is killed at 124° F. This temperature range, however, permits the germ to exercise its most important attribute i. e., its pathogenic effect upon the vascular tissues of cruciferous plants.

Its endurance capacity is another not unimportant property to be considered in the study of its life history. That it survives the winter seasons in the soil has been shown by all experimentors, while on the other hand should cruciferous plants be kept out of infected land, it may be gradually exterminated by antagonistic bacteria, coupled with the general decline of its racial strength due to the absence of the host plant. One instance in regard to this: A large field where the first year a few cases made their appearance, developed the second year a very bad condition, and after planting the third year in the same field, 90 per cent. of the cabbage crop was lost. In contrast to this another plat on the same farm, which was uninfected, was set out in cabbage from the same uncontaminated seed bed, and each year it was practically exempt from the disease.

Now the manner in which the plants became inoculated is a very interesting one. Dr. E. F. Smith of the Department of Agriculture noticed that the leaves were nearly always infected in spots, on and near the margin, which turned yellow and finally black, giving

an appearance of burnt edges. Upon close examination he found that the entrance of the bacteria could be made through the excessively large water pores, which are located on the toothed edges of the leaves of Brassica; this being especially favorable under certain weather conditions, when the stomata are wide open with minute globules of exuded water resting on them. In the early morning of the mid-summer days and in all heavy wet weather these are found present forming an easy medium for the ingress of the germs, which may reach them by wind dispersion, or the aid of insects and other cabbage inhabiting forms.

Other than this any injury to the leaf epidermis, such as the depredations of slugs and larval forms or insect bites makes easy bacterial contamination.

Once within the cells of the plant it finds its most favorable environment in the alkaline solutions of the tracheary vessels; where myriads of them swarm as they gradually work their way toward the petiole and stem of the cabbage. Their secretion dissolves the cell walls but does not enter the parenchymatous portion of the leaf, due to the absence of the favorable alkaline medium. Thus confined to the vascular system of the blades, it is but a matter of days, when they will have extended their blackened paths to the stem, and here flourishing up and down in the woody tissue soon reach other parts of the plant. If an affected leaf is held up and viewed by transmitted light, the brown veins and veinlets are clearly delineated, apart from the rest of the leaf which desiccates and discolors from lack of water, the coloring matter and bacteria completely choking off the supply.

This characteristic fact of the vascular coloration is of great importance for it forms a sure guide to the distance the disease has progressed; thus if an affected leaf is broken off and the bacteria had not reached the stem, the place of breakage would show only the delicate yellow spots indicating the healthy fibro-vascular bundles, but should the germ have already passed into the stem these are then readily seen to be stained a dark brown or black. Should any doubt, however, be entertained whether the stem had been reached or not, a cross section of it, if affected, would show a dark ring corresponding to the woody tissue.

Having reached the axial portion of the head it generally affects the plant more on one side than another, giving a characteristic lopsidedness to its appearance, though blighting the entire head for any useful purpose. Should young plants be inoculated, no heads at all may form, so rapid and persistent is the movement of the disease in the plant.

The exceeding deleterious effect of this plant malady ultimately is due to the germ secreted toxin. One experimenter seems to show this conclusively in some inoculations of turnip with *Pseudomonas destructans*, a near ally of the cabbage bacterium. This is, no doubt, the proper view to take of the matter, for as was brought out before, the extreme chemical activity of the secretion in dissolving the cellulose and lignin of the vascular vessels, shows it to be at least toward these certain plants, a virulent poison.

These various considerations are only of value, however, if working from them conclusions can be drawn resulting in definite preventives or methods to be observed, in checking and arresting the disease. Fortunately

sufficient is known about the blight, its etiology and pathogenic processes to enable the scientist to formulate concrete rules of plant and soil hygiene which if followed rigorously will help the grower to successfully cope with it.

In taking up the discussion of these precautions to be heeded, we find first of all that the greatest care should be given to the seed bed, from which the cabbages are later to be transplanted. The bed should be made where the disease has not been known to occur, or better where cruciferous plants have never been grown. The importance of this was pointed out in one instance: A farmer had made his seed bed where the refuse of the cabbage store-house had been thrown; the result being the loss of nearly his entire crop. Healthy and uncontaminated seedlings is the first requisite.

These should then be set out on new land or where the vegetable crucifers have not been raised for some years, this of course bringing about the familiar rotation of crops which is the only sure way to keep the blight out, or where once the soil has become infected, is absolutely the only method to rid it of the pest.

Again the greatest precautions must be exercised in soil manuring. The manure heaps must be kept uncontaminated with this species of bacteria, by never feeding the farm animals, cabbages or allied plants, unless sterilized by cooking. Many a farm has been rendered wholly unfit for extensive cultivation of turnips, cabbages and cauliflower by carelessness or rather ignorance in this regard.

After the cabbages are set out and started the fight against insect enemies should begin, especially the harlequin bug and cabbage moth or plusia, whose

larvæ are so prevalent and destructive. As germ carriers and distributors they alone account for much of the spread and severity of the disease. In all cases investigated it was clearly shown that where insects and other pests were numerous, the rot was extraordinarily destructive and extended. When these were kept down to a minimum, its appearance, if at all, was much localized and weakened.

Further the cabbages in the field should be watched and the leaves broken off at the first sign of trouble. Should it have reached the stem the entire plant must be removed and this collected material destroyed by fire or deep burial. This of course, acts merely as a check and does not in any way prevent further and future inoculation. All cruciferous weeds in and around the cabbage patch should be treated likewise, as their presence makes possible and additional source of infection.

Another matter, apparently related to the appearance and destructiveness of the disease is the comparative effect of early and late planting. Experiments resulted in favor of late planting; this being especially helpful for

turnips and noticeably so for cabbages. However, it was stated that these experiments were only made during one summer, thus allowing the element of seasonal variation to enter in which might give entirely different returns in another year.

In general the rules and methods of the strictest soil and plant hygiene, as have been given in recent years by the Department of Agriculture, should be followed. While these operations and the terminology is very like those applied in animal physiology and hygiene, thus seeming to the average farmer somewhat strange and out of place, yet it is shown conclusively in this day, that these problems must be attacked along somewhat similar lines since their origin arises in the same causes. And nowhere is it demonstrated with greater emphasis than in this disease, the black rot of the cabbage, which is wholly due to the activity of the micro-organism within the vascular tissues of the plant.

April 21, '08.

Read before class in Plant Diseases.

DENATURED ALCOHOL

C. E. Snyder

Alcohol can be manufactured from any substance containing starch or sugar,—sugar-cane, beets, fruits, potatoes, rice, wheat, rye or Indian corn. The possibilities of its uses, provided that the restrictions placed about its manufacture and use be not too complicated, are almost incomprehensible. Some idea of its utility even as a solvent and as a chemical reagent may be gotten from the following statement by

Prof. Duncan: "More than ten thousand factories, representing thirty distinct industries, with an aggregate capital exceeding \$500,000,000 and employing three hundred thousand workmen have been using either taxed alcohol or an inferior substitute. With the removal of the tax these figures will be enormously extended."

Alcohol as a solvent and chemical reagent is used in the manufacture of

a variety of articles. One of its most important uses is to dissolve shellac and "shellac so dissolved literally paints our civilization. It enters intimately into the manufacture and materially into the cost of furniture and all kinds of wood products, such as passenger cars, carriages, pianos, burial caskets, whips, trunks, shoe dressing, shoes, fireworks, pipes, umbrellas and innumerable other articles upon which men use varnish."

In other industries shellac is used as a binding material as in the manufacture of lead pencils, of electrical motors and generators, stiff hats and straw hats.

Alcohol is the principal item of cost in the manufacture of lacquer, used in preserving metal objects, of collodion which forms an essential part in the manufacture of all the plates, films and paper used in photography, of celluloid from which piano and organ keys, billiard balls and combs are made, of artificial silk, heretofore manufactured abroad, of smokeless powder, and of transparent soap which has been practically unknown in this country owing to the tax on alcohol.

As a power the advantages of alcohol over gasoline are strenuously disputed, and as strenuously championed. It can be used, however, in internal combustion engines like those of automobiles as gasoline is now used and as the cost decreases its use will, without doubt, advance far.

Alcohol has many advantages as a light, "the light is peculiarly agreeable; it cannot smoke; its odor is quite inoffensive; it is not affected by draughts; it gives off but little heat for the heat of combustion is largely converted into light, its wick does not

burn; the alcohol if spilled leaves no spot on the carpet or odor on the hands; it is so safe that insurance companies make no objection to its storage.

In 1904 there were used in Germany nearly seventy-four millions of gallons of alcohol which had paid no tax, while in the United States in that year not a single gallon of tax free alcohol was used.

The immense advantage to any industry using alcohol in its manufacturing process in a country where alcohol can be used for such purposes without paying a tax is apparent when we realize that alcohol can be made for from twenty to thirty cents a gallon.

Methyl or wood alcohol is poisonous and offensive to the senses and has much less industrial value than the ethyl or grain alcohol which, if used without taxation, must be made unfit for use as a beverage. This is accomplished by a process called denaturation which consists in adding to the grain alcohol a small amount of some substance or substances which are so offensive to the taste and smell and so revolting to the stomach that the mixture becomes practically undrinkable.

On January 1, 1907, a law went into effect permitting the sale of denatured alcohol free from tax. The first laws made and the first regulations issued by the Commissioners of Internal Revenue were found to be too stringent and the laws were revised and new regulations issued, their purpose being to facilitate and cheapen the manufacture of the denatured spirit. When the denatured alcohol is finally put on the market, good and cheap as it will be, then the farmer must raise bigger crops and will, we hope, make more money.

OPPORTUNITIES FOR YOUNG MEN IN AGRICULTURE

Because there has been, for a long time, a large call for information concerning opportunities for young men in agriculture, Dean Price has written a bulletin on this subject in order that some definite information might be had in an available form with which to answer this call.

He mentions the following as being sources of applications for salaried men trained in agriculture:

The Agricultural Colleges and Experiment Stations require a large and increasing force of men who are capable of doing the work.

"The rapid growth of our National Department of Agriculture with its twenty-five hundred scientists engaged in carrying on the many phases of its work, has demanded the graduates of the Agricultural Colleges who are fitted for its work as fast as they can be prepared at salaries ranging from one thousand to fourteen hundred dollars per year.

"The agricultural press, represented by over three hundred agricultural periodicals, published in the United States, is calling continually on the agricultural colleges for new recruits to fill their editorial staffs.

"The state and city governments are requiring men trained in the science of Agriculture to enforce their legislation relating to agriculture and to supervise their dairy and food supplies.

"Private individuals and corporations are asking for men trained in modern agriculture to superintend and manage farms and large tracts of land.

"Business firms appreciating the value of scientific training in agriculture are offering attractive positions to graduates as salesmen of agricultural implements and supplies.

Foreign countries are calling upon the American agricultural colleges to furnish graduates to assist them in developing their agricultural resources and to establish agricultural schools."

"The graduates of the Ohio Agricultural College, in recent years, who have gone into salaried positions immediately upon graduation have done so at salaries ranging from eight hundred to fifteen hundred dollars per year and at an average salary of not less than one thousand dollars per year."

In comparing salaried positions with the opportunities in private business Dean Price says in part: "There is no question that private business for the young man who has capital with which to begin, offers the greatest opportunity for success. In specialized form of agriculture there is almost an unlimited field for success."

SOME POSITIONS THAT ARE BEING FILLED BY GRADUATES OF THE OHIO COLLEGE OF AGRICULTURE.

Paul Fischer, 1891, State Veterinarian of Ohio.

Frank William Rane, 1891, State Forester of Massachusetts.

William Rennick Beattie, 1894, Horticulturist in U. S. Department of Agriculture.

C. W. Burkett, 1895, Director, Kansas Agricultural Experiment Station.

E. J. Riggs, 1895, Deputy Inspector, Ohio Dairy and Food Department.

R. W. Dunlap, 1895, Ohio Dairy and Food Commissioner.

J. F. Cunningham, 1897, Editor, Ohio Farmer.

H. C. Price, 1897, Dean, College of Agriculture and Domestic Science, Ohio State University.

(Concluded on page 20.)

THE AGRICULTURAL STUDENT

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M. D. Moore	H. E. Allen
R. M. Wilber	A. H. McCray

JUNE

THE STUDENT will thankfully receive and be glad to publish any items of news that you can give us about yourself or others who have attended the University. There are many of our readers anxious to hear about those whom they knew in school.

Those of us who have been acquainted with this paper during the past few years will realize and appreciate its great improvement in the last year. All credit is due to Editor Kinney, now in Lexington, Ky., and Business Manager Williams, now in Washington, D. C. These men worked entirely for the interests of the paper with the result that the College is becoming proud of her paper and feels that she really owes thanks to Messrs. Kinney and Williams for what they have done.

We, of the new staff will make every effort to keep the paper up to its present excellent standard and we ask your co-operation in all that we do.

Graduation day draws near for those who have striven for four years that they might be the proud possessors of a bachelor's degree. Those of us who are left behind will indeed miss them very much, and we realize this more

and more as the time draws near when they go forth to return no more to their Alma Mater as students. Bonds of friendship so strong that they will last through life are often made unconsciously and we do not realize their strength until something unusual occurs to reveal them to us. THE STUDENT wishes to extend most sincere congratulations and earnest wishes that all the word's best may come to our Seniors.

UNIVERSITY NEWS AND ALUMNI NOTES.

E. W. Bennage has been testing cows for F. N. Burr, Wauseon, Ohio.

The Dairy Department has installed a new brine cooling system and a new water condenser.

Prof. Lazenby gave an address before the May meeting of the Muskingum County Horticultural Society, on the subject, "Friends and Enemies of Horticulture." This is the twelfth year that Prof. Lazenby has been on the program of this society.

Roy Fredericks tested cows for Mr. Watson, Sheridan, Ohio.

The Empire Cream Separator Company has put new machines in the Dairy Department.

C. J. Koontz, '07, was at the University the week of May 11. He is farming near New Carlisle, O.

R. C. E. Wallace, '06, was at the University on May 12. He is connected with the Ohio Experiment Station.

The class in landscape gardening has been visiting the parks and some of the best kept private grounds in Columbus. Each member has to prepare some plans for laying out walks and drives, and arranging trees, shrubs and flowers. The University campus is also studied and its beauties and defects are pointed out.

Rudo L. Fromme, who graduated from the Department of Horticulture and Forestry in 1905, and now holds an important position in the United States Forest Service, was married on May 30 to Miss Ruby Ellen Gawanlock, at Priest River, Idaho. His address is Newport, Washington.

The small plantation of catalpas just south of Horticultural Hall came through the winter in fine condition. Their rapid growth during a few weeks past has attracted much attention and has elicited many questions from those seeking information. For purposes of comparison about the same number of seedling catalpas have been planted this spring.

STATE AND NATIONAL CORN SHOWS.

The state corn show will be held in Columbus on the week beginning Nov. 23, 1909. Various prizes will be offered. Probably many implements will be given as prizes. Most of the prizes will be for best exhibits of yellow and white corn. There will be prizes for best county exhibit, considering quality and quantity. Extra prizes will be offered for the best work done in the cost of production of corn. The contest being decided upon the relation between cost of production and yield per acre, on the yield itself and on the fullness of the report. It shall include the entire cost of fertiliz-

ing and planting, caring for and harvesting the crop. Blanks will be out in a short time for recording this work. A good program of the best national and state speakers will be offered.

An effort will be made to hold as many of the local shows as possible before the state show in order that the best exhibits at the local shows may be exhibited at the state show. The State Association reserves the right to select any desirable samples at the state show to exhibit at the national show to be held in Omaha, December 10-19, 1908, in the owners' name, however, and the prizes taken, if any, to go to the owner.

Besides the premiums to world classes at Omaha there will be a special list for Ohio exhibitors as well as for exhibitors from the other principal corn states.

GRADUATE SCHOOL OF AGRICULTURE.

The third session of the Graduate School of Agriculture will be held July 6-31, 1908, at Cornell University, Ithaca, New York, and The New York Agricultural Experiment Station, Geneva, New York. It is under the auspices of the Association of American Agricultural Colleges and Experiment Stations.

The first session of the Graduate School of Agriculture was held at Columbus, Ohio, in July, 1902, under the auspices of Ohio State University. This session was quite successful, being attended by seventy-five students from twenty-eight states and territories, Canada and Argentina. The continuance of the school therefore seemed desirable. At the convention of the Association of American Agricultural Colleges and Experiment Stations, held in Washington, D. C., in November, 1905, the association voted to assume

responsibility for the Graduate School. Under these auspices the second session of the school was held at the University of Illinois during the month of July, 1906. The total enrollment of this school was 131, of whom ninety-one were classed as students. These came from thirty-four states and territories, Hungary and India. On invitation of Cornell University and the New York Agricultural Experiment Station arrangements have been made to hold the third session at Ithaca and Geneva.

The purpose of the Graduate School of Agriculture is to give advanced instruction in the science of agriculture, with special reference to the methods of investigating agricultural problems and teaching agricultural subjects.

Many men, prominent in agricultural work the world over, will be present to give instruction. Among them, Prof. Dr. N. Yuntz, Professor of Animal Physiology, Royal Agricultural College, Berlin, Germany, and A. D. Hall, Director of the Rothamsted Experiment Station, England.

Prof. A. G. McCall, of the Ohio Agricultural College, will deliver five lectures for Prof. T. L. Lyon, of Cornell University, who has charge of "Methods of Instruction in Agronomy."

BOOK REVIEW.

Herbert N. Casson's great agricultural story, "The Romance of the Reaper," is a history of the development of agriculture during the last eighty years, and vividly portrays the results which have been accomplished by labor-saving agricultural machinery. It also shows how a great industry has grown up in the United States, and how, by concentrating plants and resources and manufacturing on a large scale, Americans are able to sell machines with profit in every country of the globe. It is a very instructive and fascinating story.

OPPORTUNITIES FOR YOUNG MEN IN AGRICULTURE.

(Concluded from page 17.)

C. K. McClelland, 1898, Superintendent, Ft. Hays Branch Experiment Station of Kansas.

Oscar Erf, 1899, Professor of Dairying, Ohio State University.

V. H. Davis, 1900, Assistant Professor of Horticulture, Ohio State University.

E. O. Fippin, 1900, Assistant Professor of Agronomy, Cornell University, New York.

C. C. Hayden, 1900, Instructor and Assistant in Illinois Agricultural Experiment Station.

A. G. McCall, 1900, Professor of Agronomy, Ohio State University.

M. F. Miller, 1900, Professor of Agronomy, University of Missouri.

C. N. Mooney, 1900, Assistant, Bureau of Soils, U. S. Department of Agriculture.

F. W. Taylor, 1900, Professor of Agriculture and Agriculturalist to New Hampshire Agricultural College and Experiment Station.

F. J. Tyler, 1900, Botanist, U. S. Department of Agriculture.

A. F. Conradi, 1901, Entomologist, South Carolina Agricultural College.

M. W. Harper, 1901, Instructor, Animal Husbandry, Cornell University, New York.

A. H. Snyder, 1901, Agricultural Extension Department, Iowa State College.

E. L. Shaw, 1902, Bureau of Animal Industry, U. S. Department of Agriculture.

O. E. Jennings, 1903, Custodian, Botanical Collections, Pittsburg Carnegie Museum.

J. H. Beattie, 1904, Entomologist, U. S. Department of Agriculture.

M. O. Bugby, 1904, Assistant Experimentalist, Ohio Agricultural Experiment Station.

I. J. Condit, 1905, Horticulturist and Botanist, California Polytechnic School.

E. C. Cotton, 1905, Entomologist, Tennessee Agricultural Experiment Station.

J. T. Dallas, 1905, Inspector, U. S. Department of Agriculture, Bureau of Animal Industry.

J. V. Hyatt, 1905, Superintendent, Waddington Farms, West Virginia.

E. R. Minns, 1905, Superintendent of College Farm, Cornell University, New York.

L. M. Smith, 1905, Horticulturist and Entomologist in University of West Virginia.

T. L. Wheeler, 1905, Agricultural Editor, Chicago Daily Drovers' Journal, Illinois.

J. C. White, 1905, Associate Editor, Farm and Fireside, Springfield, Ohio.

L. E. Call, 1906, Assistant Agronomist, Kansas Agricultural College.

R. C. Doneghue, 1906, Assistant Agronomist, University of Missouri.

W. E. Evans, 1906, Deputy Nursery Inspector of Ohio.

R. W. Harned, 1906, Assistant Biologist, Mississippi Agricultural Experiment Station.

J. E. McClintock, 1906, Extension Department, University of Maine.

C. L. Miner, 1906, Assistant Ranch Manager in Mexico.

N. E. Shaw, 1906, Chief Nursery Inspector of Ohio.

E. D. Waid, 1906, Assistant Agronomist, University of Maine.

R. C. E. Wallace, 1906, Assistant, Ohio Agricultural Experiment Station.

G. A. Crabbe, 1907, Assistant Agronomist, Cornell University, New York.

W. J. Davis, 1907, Assistant Agricultural Chemist, Ohio State University.

H. C. George, 1907, Assistant, Ohio Agricultural Experiment Station.

H. C. Green, 1907, Assistant, Ohio Agricultural Experiment Station.

F. D. Heckathorn, 1907, Deputy Ohio Nursery Inspector.

G. R. Hyslop, 1907, Assistant Agronomist, Ohio State University.

J. C. McNutt, 1907, Assistant, Department of Animal Husbandry, New Hampshire State College.

E. J. Petry, 1907, Assistant Botanist, Cornell University, New York.

E. C. Richey, 1907, Assistant, Bureau of Standardization, U. S. Department of Agriculture.

S. H. Shawan, 1907, Assistant, Bureau of Animal Husbandry, U. S. Department of Agriculture.

R. L. Shields, 1907, Assistant, Extension Department, Ohio State University.

O. J. B. Smith, 1907, Instructor in Horticulture, Iowa State College.

J. B. Barker, 1908, Assistant in Chemistry, Iowa State College.

E. J. Kinney, 1908, Assistant Entomologist, Kentucky Experiment Station.

O. M. Johnson, 1908, Agricultural Lecturer, German Kali Works, New York City.

A. H. McCray, 1908, Assistant in Bureau of Entomology, U. S. Department of Agriculture.

J. O. Williams, 1908, Assistant, Bureau of Animal Industry, U. S. Department of Agriculture.

C. S. Woodard, 1908, Assistant in Animal Husbandry, Tuskegee Institute, Alabama.

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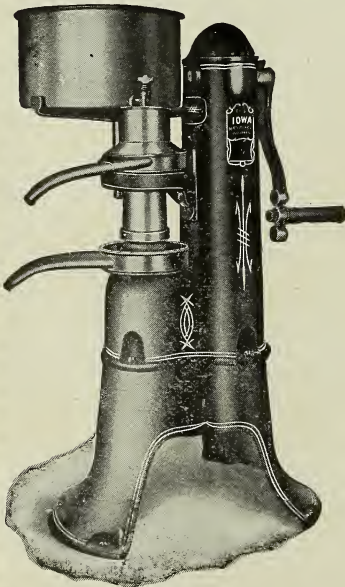
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Anything that affects a man's pocketbook touches him in a vital spot, hence if you are a feeder or shipper of live stock the selection of a commission firm to handle your consignments ought to be a pretty interesting subject to you.

Are you sure that you are getting the very best service in the handling of your live stock? Anyone can sell live stock, but only a very few of the best and highest-paid salesmen in the business have that broad and intimate knowledge of men and market, that inborn talent for trading, that count so heavily in the shipper's favor.

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R. B. Wyatt, Reserve, Kansas, writes our Kansas City house: "I want to thank you for the interest you took in selling my yearlings. You certainly worked hard to get that other nickel, and I am well pleased and appreciate same."

W. B. Widman, Bigelow, Minn., writes our Sioux City house: "Your sale of car of hogs made for me was very satisfactory. They were well sold considering the condition of the market. I hope some time to have more stock for you to sell for me. I know you are very competent to get good returns for all hogs I may ship to you."

F. W. Merrill, Kaneville, Ill., writes: "I am well pleased with your sale of my cattle. They were on feed only ninety days and gave me a margin of \$1.85 per cwt. I consider them well bought and well sold and shall consign my next shipment to Clay, Robinson & Co."

Lonnie Rummel, Swanington, Indiana, writes: "I am this morning in receipt of the load of lambs you bought for me and am well pleased with them. They surely are a good lot."

B. B. Baker, Monticello, Indiana, writes: "I wish to thank you for the last two cars of feeding sheep you sent me. They were exactly what I wanted. I think this last lot made you some customers in this vicinity as two parties have promised me to order from you."

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Three Years Old and Under Four		1st.	2nd. 4th.
Two Years Old and Under Three		2nd.	5th.
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Champion Stallion.

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Three Years Old and Under Four		1st.	2nd.	

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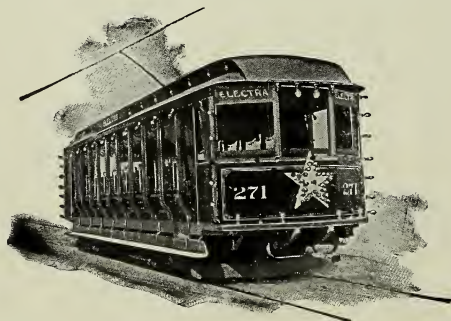
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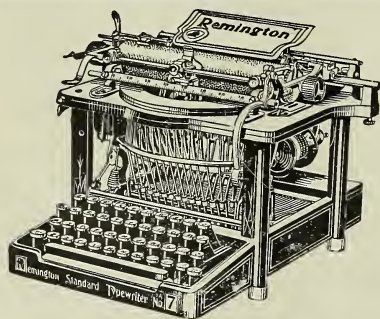
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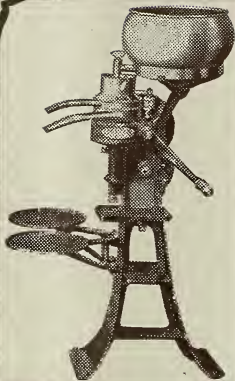
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